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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,823	09/22/2003	Osamu Nozawa	0524-0140.01	1017

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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 05/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/667,823

Applicant(s)

NOZAWA ET AL.

Examiner

Rodney G. McDonald

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-22 and 27 is/are pending in the application.
- 4a) Of the above claim(s) 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/951,816.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/19/04.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of Group II, Claims 15-22, in the reply filed on 4-15-05 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. "Attenuated phase-shifting masks of chromium aluminum oxide", Applied Optics, Vol. 32, No. 19, July 1, 1998 in view of Fujikawa et al. (Japan 01-173718).

Regarding claim 15, Kim et al. teach an apparatus for depositing a phase-shifting mask layer for a photomask. (See Abstract) The apparatus is shown in Fig. 3 with the target directed downward in the direction of gravity and the substrate directed upwards with respect to the direction of gravity. (See Fig. 3; page 4255) Table 1 shows the parameters used when depositing the film. (See Table 1; page 4256)

The difference not yet discussed is shielding the peripheral edge of the substrate to prevent film from being formed on the peripheral edge.

Fujikawa et al. teach providing a substrate 2 opposite a target for sputtering and shielding the circumferential part of the substrate 2 from the target and a light shielding film is formed by sputtering. (See Abstract)

The motivation for shielding the peripheral edge of the substrate is that it allows for preventing electrification of the plate when electron exposing. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Kim et al. by utilizing a shield on the peripheral part of the substrate as taught by Fujikawa et al. because it allows for preventing electrification of the plate when electron exposing.

Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. "Attenuated phase-shifting masks of chromium aluminum oxide", Applied Optics, Vol. 32, No. 19, July 1, 1998 in view of Tanaka (U.S. Pat. 5,824,197) and Mostovoy et al. (U.S. Pat. 6,428,663).

Regarding claim 16, Kim et al. is discussed above and all is as applies above. (See Kim et al. discussed above) Kim et al. further teach utilizing DC magnetron

sputtering for forming the film. The apparatus has at least a sputtering target, a magnetron cathode, a substrate holder. The surface of the target is directed downwards with respect to a gravity direction. (See Kim et al. page 4255)

The differences between Kim et al. and the present claims is that a shield disposed on the inner wall of the vacuum tank is not discussed (Claim 16), the shield having a mechanism for reducing film formation on the surface of the shield is not discussed (Claim 16), a mechanism for reducing film formation on the non-sputtered area on the target is not discussed (Claim 16), and the surface of the backing plate being roughened is not discussed. (Claim 21)

Regarding a shield disposed on the inner wall of the vacuum tank (Claim 16), Tanaka teach disposing a shield on a wall of a vacuum chamber. (Tanaka Column 3 lines 20-26)

Regarding the shield having a mechanism for reducing film formation on the surface of the shield (Claim 16), Tanaka teach that the target shield should have a concave, curved surface away from a target so that the sputtered particles have improved vertical directionality. (See Abstract) The shape of the shield reduces the number of ions lost from the plasma. (Column 3 lines 30-33) The shape of the shield also effects the atoms or ions are controlled to be vertical direction with respect to the target. (Column 3 lines 65-67) Thus the shape of the shield decreases the deposition on the shield and increasing the deposition on the substrate surface.

The motivation for having a shield on the inner wall of the vacuum tank and for shaping the shield to reduce film formation on the surface of the shield is that it allows

for protecting the chamber walls and for improving sputter deposition uniformity at low pressures. (Column 1 lines 52-53; Column 2 lines 51-52)

Regarding the mechanism for reducing film formation on the non-sputtered area on the target (Claim 16) and the roughening of the backing plate (Claim 21), Mostovoy et al. teach a target which has a front surface 103 and side surface 105. A coating 107 is applied to the side surface 105 of the target 101 (i.e. to shield the side surface) The coating 107 preferably has a surface roughness greater than 200 microinches. The coating may also be applied to a portion of the target's backing plate 108 as shown in Fig. 2. (i.e. to shield that portion of the backing plate). (Column 3 lines 38-47)

The motivation for providing a mechanism for shielding the surface of the nonsputtered area of the target and roughening the backing plate is that it allows for preventing crumbling of sputtered particles. (Column 3 line 55)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Kim et al. by disposing a shield on the inner wall of the vacuum tank and providing the shield with a mechanism for reducing film formation on the surface of the shield as taught by Tanaka and to have provided a mechanism for reducing film formation on the non-sputtered area on the target and roughening the backing plate as taught by Mostovoy et al. because it allows for or protecting the chamber walls, for improving sputter deposition uniformity at low pressures and for preventing crumbling of sputtered particles.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Tanaka and Mostovoy et al. as applied to claims 16 and 21 above, and further in view of Ballentine et al. (U.S. Pat. 5,248,402).

The differences not yet discussed is where the mechanism for reducing film formation onto the non-sputtered area on the target is a whole-surface erosion cathode used as the magnetron cathode, a mechanism for shielding the non-sputtered area on the target or a mechanism for roughening the surface of the non-sputtered portion of the target.

Regarding the whole-surface erosion cathode used as the magnetron cathode, Ballentine et al. teach utilization of a magnetron that ensures that erosion occurs over the entire surface of the target so that the target is kept clean during the sputtering process. (Column 1 lines 55-59) The substrate can be an optical element. (Column 3 lines 13-16)

The motivation for utilizing a magnetron that utilizes whole surface erosion is that it allows the target to be kept clean during sputtering. (Column 1 lines 55-59)

Regarding a mechanism for shielding the non-sputtered area on the target, Mostovoy et al. discussed above already teach shielding the non-sputtered area on the target with an arc spray coating. (See Mostovoy et al. discussed above)

Regarding a mechanism for roughening the surface of the non-sputtered portion of the target, Mostovoy et al. discussed above already teach roughening the non-sputtered area on the target with a rough arc spray coating. (See Mostovoy et al. discussed above)

The motivation for providing a mechanism for shielding the surface of the nonsputtered area of the target with a rough surface is that it allows for preventing crumbling of sputtered particles. (Column 3 line 55)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a whole-surface erosion cathode as taught by Ballentine et al. and to have utilized a mechanism for shielding the non-sputtered area on the target or a mechanism for roughening the surface of the non-sputtered portion of the target as taught by Mostovoy et al. because it allows for keeping the target clean and preventing crumbling of particles.

Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Tanaka and Mostovoy et al. and further in view of Ballentine et al. as applied to claims 16, 17 and 21 above, and further in view of Gogh et al. (U.S. Pat. 6,620,296).

The difference not yet discussed is where the target has a curved surface and where the end surface of the target is roughened.

Regarding the target having a curved surface, Gogh et al. teach in Fig. 3C providing a target with a curved surface. (See Fig. 3C: Column 4 lines 60-68; Column 5 lines 1-16)

Regarding the end surface of the target being roughened, Gogh et al. teach texturizing the redeposition area with Al arc spray material. (Column 7 lines 66-68; Column 8 lines 1-4)

The motivation for utilizing a curved surface and a texturized surface is that it allows for reducing particles during sputtering. (Column 1 lines 59-61)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a curved surface and a texturized surface as taught by Gogh et al. because it allows for reducing particles during sputtering.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Tanaka and Mostovoy et al. as applied to claims 16 and 21 above, and further in view of Katsura et al. (U.S. Pat. 4,933,063).

The difference not yet discussed is the control of film formation speed by the shape of the shield and the use of the heating means for the shield.

Regarding the control of film formation speed, Tanaka discussed above suggest the shape of a shield such that the film formation rate is increased on the substrate and not on shield. (See Tanaka discussed above)

The motivation for utilizing a shield for controlling film formation speed is that it allows for improving sputter deposition uniformity at low pressures. (Tanaka Column 2 lines 51-52)

Katsura et al. teach the use of heater for heating a protection plate to a specified temperature and to maintain the specified temperature after sputtering is complete. (See Abstract)

The motivation for providing a heater to a shield is that it allows for reducing the amount of dust particles. (Column 2 lines 24-26)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shield to control of film formation speed by the shape of the shield as taught by Tanaka and to have utilized heating means for the shield as taught by Katsura et al. because it allows for improving sputter deposition uniformity at low pressures and reduced the amount of dust particles.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Tanaka and Mostovoy et al. and further in view of Katsura et al. as applied to claims 16, 19 and 21 above, and further in view of Mintz et al. (U.S. Pat. 6,162,297).

The differences not yet discussed is the mechanism for forming the corner in the shield into a curved surface, the earth shield disposed above the target plane and the roughening of the shield.

Regarding the mechanism for forming the corner in the shield into a curved surface, Tanaka is discussed above and teaches a concave curved surface away from the target. (See Tanaka Abstract)

Regarding the earth shield disposed above the target plane, Tanaka is discussed above and teach extending the curved portion of the shield above the surface of the target. (Tanaka Column 4 lines 45-47)

The motivation for forming the corner of the shield in a curved surface and extending the shield above the target plane is that it allows for improving sputter deposition uniformity at low pressures. (Column 2 lines 50-52)

Regarding the roughening of the shield, Mintz et al. teach knurling a shield to provide a roughness for reducing particle contamination. (Column 1 lines 60-68; Column 2 lines 9-20; Column 2 lines 24-34)

The motivation for roughening the surface of a shield is that it reduces particle contamination. (Column 2 line 25)

Therefore, it would have been obvious to one of ordinary skill art at the time the invention was made to have utilized a curved corner in the shield and an earth shield disposed above the target plane as taught by Tanaka and to have roughened the shield as taught by Mintz et al. because it allows for improving sputter deposition uniformity at low pressures and reduces particle contamination.

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al. in view of Tanaka and Mostovoy et al. as applied to claims 16 and 21 above, and further in view of Fujikawa et al. (Japan 01-173718).

The difference not yet discussed is the use of a shield plate for shielding the peripheral edge of the substrate.

Fujikawa et al. is discussed above and teach a shield plate for shielding the peripheral edge of a substrate. (See Fujikawa discussed above)

The motivation for shielding the peripheral edge of the substrate is that it allows for preventing electrification of the plate when electron exposing. (See Fujikawa Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a shield on the peripheral part of the

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substrate as taught by Fujikawa et al. because it allows for preventing electrification of the plate when electron exposing.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
May 23, 2004